

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An article comprising a machine-accessible medium having stored thereon instructions that, when executed by a machine, cause the machine to:

obtain from a performance monitor data on runtime performance data of a thread, the data being indicative of an execution characteristic of the thread ~~a thread-level utilization;~~
and

based on the performance data, adjust an operating voltage or an operating frequency of the machine, wherein the operating voltage and operating frequency are nonzero.

2. (Original) The article of claim 1, wherein the performance monitor is a Performance Monitoring Unit (PMU).

3. (Original) The article of claim 2, wherein the PMU is part of a central processing unit (CPU) within the machine.

4. (Original) The article of claim 2, wherein the PMU includes a plurality of counters for measuring different performance data.

5. (Original) The article of claim 1, wherein the runtime performance data is selected from the group consisting of instruction cache misses, data cache misses, instructions executed, branches executed, branch mis-predicts, instruction translation look-up buffer TLB misses, data translation look-up buffer TLB misses, stalls due to data dependency, and data cache write-backs.

6. (Original) The article of claim 1, having further instructions that, when executed by the machine, cause the machine to:

in response to the performance data, determine if the operating voltage and operating frequency should be adjusted upward or scaled down.

7. (Original) The article of claim 6, having further instructions that, when executed by the machine, cause the machine to:

compare the performance data to a voltage and frequency scheduler lookup table that stores at least one voltage value and at least one frequency value.

8. (Original) The article of claim 1, having further instructions that, when executed by the machine, cause the machine to:

obtain a plurality of runtime performance data; and

in response to the plurality of runtime performance data, adjusting the operating voltage and the operating frequency.

9. (Original) The article of claim 1, wherein the performance data is an instructions-per-cycle metric.

10. (Original) The article of claim 1, wherein the performance data is a memory references-per-cycle metric.

11. (Original) The article of claim 1, having further instructions that, when executed by the machine, cause the machine to:

operate the performance monitor in an operating system environment in communication with a platform hardware environment, in a kernel mode, and in communication with an end user code, in a user mode.

12. (Original) The article of claim 1, wherein the instructions, when executed by the machine, cause the machine to adjust the operating voltage and the operating frequency.

13. (Currently Amended) A method comprising:
obtaining, from a performance monitor, data on runtime performance data of a thread,
the data being indicative of an execution characteristic of a thread ~~a thread-level utilization~~
for a central processing unit (CPU) having an operating voltage and an operating frequency;
in response to the runtime performance data, determining if either the operating
voltage or the operating frequency is at a desired value; and
in response to the determination, adjusting the operating voltage or the operating
frequency, wherein the operating voltage and operating frequency are nonzero.

14. (Original) The method of claim 13, further comprising:
adjusting both the operating voltage and the operating frequency.

15. (Original) The method of claim 14, further comprising adjusting the
operating voltage and the operating frequency upward.

16. (Original) The method of claim 14, further comprising adjusting the
operating voltage and the operating frequency downward.

17. (Original) The method of claim 13, wherein the performance monitor is a
Performance Monitoring Unit (PMU).

18. (Original) The method of claim 13, wherein the runtime performance data
is selected from the group consisting of instruction cache misses, data cache misses,
instructions executed, branches executed, branch mis-predicts, instruction translation look-up
buffer misses, data translation look-up buffer misses, stalls due to data dependency, and data
cache write-backs.

19. (Original) The method of claim 13, further comprising comparing the
performance data to a voltage and frequency scheduler lookup table that includes at least one
voltage value and at least one frequency value.

20. (Original) The method of claim 19, further comprising:
benchmarking the CPU;
determining the at least one voltage value and the at least one frequency value in
response to the benchmarking; and
creating a lookup table of the at least one voltage value and the at least one frequency
value.

21. (Original) The method of claim 13, further comprising adjusting the
operating voltage or the operating frequency in response to an instructions-per-cycle metric
or a memory-references-per-cycle metric.